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Porcine Reproductive and Respiratory Syndrome

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Porcine Reproductive and Respiratory Syndrome (PRRS), formerly known as Mystery Swine Disease, first became apparent in the United States in 1986. In the next few years, it affected a majority of herds in every state that raised pigs. Infected piglets died during gestation or were born so weak they couldn't suckle and died shortly thereafter. Economic losses were estimated at \$250–\$300 per breeding-age female, so a typical 600-sow farm could lose \$150,000–\$180,000 per outbreak, excluding other costs. As losses mounted, producers tried one method of

diagnosis and treatment after another, to no avail. By 1990, PRRS had appeared in Europe and was well on the way to becoming a global epidemic. The National Pork Producers Council considered the disease “the most important animal health problem affecting pigs.”

Scientists discovered early on that PRRS was caused by a highly contagious virus. But they couldn't begin to think about controlling the disease and its spread until they understood how the virus functioned. How is the virus transmitted from pig to pig?, they wondered. Where does it replicate in the animal?

PIGLET ILL WITH PRRS.



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The finding that the virus spreads to other organs via the bloodstream suggested that a vaccine could be successful.

TWO PRRS VIRAL PARTICLES
MAGNIFIED APPROXIMATELY
250,000 TIMES.

How long does the virus live?

Researchers at South Dakota State University and the University of Minnesota began to unravel the mystery of PRRS with funding from the National Research Initiative (NRI) Competitive Grants Program of USDA's Cooperative State Research, Education, and Extension Service and from the National Pork Producers Council. Using both conventional and "high tech" laboratory techniques, the scientists identified the primary targets of the virus: the lung, heart, blood vessels, and lymph nodes. Research showed that the PRRS virus is transmitted from pig to pig by close contact (for example, by nose-to-nose touching, by exposure to nasal and other bodily secretions, by semen to female pigs, and from mother pig to fetus).

The PRRS virus replicates in an unknown primary target tissue and then is released into the bloodstream, where the infection spreads to other tissues. The virus remains active for at least 21 days and can be isolated from blood and nasal

secretions during this period.

The finding that the virus spreads to other organs via the bloodstream was of major importance, because it suggested that a vaccine could be successful. With an effective vaccine, inoculated pigs could produce antibodies to the PRRS virus, and the clinical disease and death rate would be reduced.

In partnership with private industry, the scientists went to work. First, they weakened the PRRS virus by passing it through a cell culture until it could no longer cause disease. Then they used the weakened form of the virus to produce a vaccine.

To aid in diagnosing PRRS, the researchers also developed very specific antibodies (termed "monoclonal" antibodies) for use in laboratory tests of pig serum or tissue samples. With these antibodies, PRRS could be diagnosed quickly, accurately, and economically—thus reducing treatment costs and producer losses.

Today, Porcine Reproductive and Respiratory Syndrome continues to challenge producers, scientists, and others as new strains of the virus emerge. The vaccine and diagnostic resources described above represent significant progress in understanding and combating the disease. These resources, now widely used, were developed as a result of basic research supported by the National Research Initiative Competitive Grants Program. ❖



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